The JOURNAL of GEOGRAPHY

PERIODICAL ROOM
GENERAL LIBRARY
UNIV. OF MICH.

VOLUME XLIII FEBRUARY, 1944 NUMBER 2

In This Issue

Research in Pacific Ocean Geography . . . . . *Eliot Grinnell Mears*

A Little-Known Sugar Bowl in Florida . . . . . *L. LeMar Stephan*

The Baltic Sea—Commercial Blind Alley . . . . . *W. O. Blanchard*

Map Reading. Lesson VI . . *Elaine Forsyth*

Tropical Agricultural Production for Consumption in the United States . *Eugene Mather*

Editorial Notes and News . . . . .

Geographical Publications . . . . . .

Published by A. J. NYSTROM & CO., for THE NATIONAL COUNCIL OF GEOGRAPHY TEACHERS
GEORGE J. MILLER, *Editor*

The JOURNAL *of* GEOGRAPHY

GEORGE J. MILLER, *Editor*
CORA P. SLETTEN, *Assistant Editor*
State Teachers College, Mankato, Minn.

Associate Editors

G. T. RENNER, Teachers College, Columbia University
R. M. BROWN, Rhode Island College of Education, Providence
E. E. LACKEY, University of Nebraska, Lincoln
ERNA GRASSMUCK GILLAND, California, Pennsylvania
J. R. WHITAKER, George Peabody College for Teachers, Nashville, Tenn.
D. C. RIDGLEY, Clark University, Worcester, Mass.
EDITH P. PARKER, University of Chicago

National Council of Geography Teachers
FLOYD CUNNINGHAM, *President*, State Teachers College, Florence, Alabama
THOMAS F. BARTON, *Secretary*, State Normal University, Carbondale, Illinois

---

SUBSCRIPTION TERMS

The subscription price is $2.75 a year, payable in advance. The price of single copies is 35 cents. Postage prepaid on subscriptions from the United States, Canada, Canal Zone, Republic of Panama, Puerto Rico, Cuba, Virgin Islands of the United States, Dominican Republic, Philippines, Guam, Samoan Islands, Hawaii, Mexico, Costa Rica, Guatemala, Nicaragua, Republic of Honduras, Salvador, Argentina, Bolivia, Brazil, Colombia, Ecuador, Paraguay, Peru, Uruguay, Spain and Spanish Colonies. All other countries in the Postal Union add for postage 27¢ on annual subscriptions (total $3.02), on single copies 3¢ (total 38¢). All subscriptions are payable in United States Dollars.

***The Journal* is the official organ of the National Council of Geography Teachers and is sent to all members of the organization. The annual dues, $2.50, are payable to the *Journal of Geography*.** Extra postage rates for copies sent to foreign countries should be added to the membership dues.

Patrons are requested to make all remittances payable to the *Journal of Geography*, in postal or express money orders or bank drafts.

Members and subscribers who wish to continue receiving the *Journal* must send remittances promptly to assure the volume being complete.

Send manuscript and books for notice or review to the *Editor*.
Send orders for back numbers to *Journal of Geography*.

Published monthly except June, July and August

PUBLICATION OFFICES: 450-454 AHNAIP STREET, MENASHA, WISCONSIN

Business Correspondence, Membership Dues, and Subscriptions may be sent to Publication office or to

A. J. NYSTROM AND COMPANY
PUBLISHERS, JOURNAL OF GEOGRAPHY
3333 ELSTON AVENUE, CHICAGO

Entered as second-class matter January 15, 1919 at the post office of Menasha, Wisconsin, under the Act of March 3, 1879.

The JOURNAL *of* GEOGRAPHY

CONTENTS FOR FEBRUARY, 1944

Research in Pacific Ocean Geography. By Eliot Grinnell Mears ... 41

Dr. Mears is Professor of Geography and International Trade at Stanford University and President of the Association of Pacific Coast Geographers. Among his well-known books are: Maritime Trade of Western United States, Greece Today, and Modern Turkey.

A Little-Known Sugar Bowl in Florida. By L. LeMar Stephan 49

Professor Stephan, Head of the Department of Geography, State Teachers College, Troy, Alabama, is now on leave serving as an instructor in the Army Air Corps at Birmingham-Southern College. His numerous contributions to the scientific and educational phases of geography have appeared in the JOURNAL OF GEOGRAPHY, *Economic Geography*, and *Scientific Monthly*.

The Baltic Sea—Commercial Blind Alley. By W. O. Blanchard ... 62

Dr. Blanchard is Professor of Geography, University of Illinois, and co-author of the well-known text Economic Geography of Europe. Many of his other geographic contributions will be found in previous issues of the JOURNAL OF GEOGRAPHY, *Scientific Monthly, Geographical Review*, and *Economic Geography*.

Map Reading. Lesson VI. By Elaine Forsyth 71

Miss Forsyth is Assistant Professor in the Department of Social Studies, New York State College for Teachers at Albany. This is the sixth in a series of nine lessons on map reading, designed for junior high school level. Have you tried out these lessons with your students? Please tell us whether you have been successful in using them. What are the merits and demerits of the lessons?

Tropical Agricultural Production for Consumption in the United States. By Eugene Mather 76

Mr. Mather is an instructor in the war training program at the University of Wisconsin, and co-author of "Out with Geographical Illiteracy," in the *School Executive* for November, 1943.

Editorial Notes and News 78

Geographical Publications 80

Contents of the JOURNAL are indexed regularly in the *Educational Index to Periodicals*
Authors alone are responsible for opinions and statements in the JOURNAL

An exceptionally beautiful wall chart presenting

THE RACES OF THE WORLD AND WHERE THEY LIVE

By courtesy of Field Museum of Natural History, Chicago

You will be thrilled to make the acquaintance of these chosen representatives of the human race. These truly life-like reproductions of the 96 famous figures sculptured by **Malvina Hoffman** for the **Field Museum of Natural History** are arranged geographically around an interpretive map, showing the habitat of the many tribes and races scattered all over the world. An authoritative document and priceless recording of racial portraiture, reproduced in 11 colors, mural size (42" x 52") on heavy ledger, varnished, in mail tube, postpaid $2.00.

C. S. Hammond & Co.

Educ. Dept. 90B Lexington Ave., New York 16, N.Y.

CO-OPERATE

•

You need membership in the National Council of Geography Teachers

You need the JOURNAL OF GEOGRAPHY

Both need your loyal support

Both will contribute to your success

Both are only $2.50 a year

Send it at once to

The Journal of Geography
3333 Elston Avenue
Chicago, Ill.

Take Pleasure

to your friend. In these troubled times what could be a finer gift than a membership in the National Council of Geography Teachers and the Journal of Geography? With the great demand for more and better geographic education, what could be a more helpful and welcome aid to your friend? Now is the time to act. Send the dues (only $2.50) to the Editor and he will write your friend explaining your splendid gift.

JOURNAL OF GEOGRAPHY
STATE TEACHERS COLLEGE
MANKATO, MINNESOTA

The JOURNAL *of* GEOGRAPHY

Copyright 1944, by the National Council of Geography Teachers

VOLUME XLIII FEBRUARY, 1944 NUMBER 2

RESEARCH IN PACIFIC OCEAN GEOGRAPHY*

ELIOT GRINNELL MEARS
Stanford University

The agenda of this Third Assembly of the Pan American Institute of Geography and History offers us a wide variety of topics of a significant nature. Unfortunately time does not permit an intensive study of each one of these, nor is it possible to treat any one exhaustively for every one of the American Republics. There is the further question of the allocation of time between the subjects of geography and history, a situation which does not concern me greatly, especially since I am constantly baffled to discover where geography begins and history ends, or where history begins and geography ends. I am willing to leave this matter of the definition of disciplines, as well as their scope, to academic scholars to whom these differentiations have a real meaning. My distinct preference is to avoid this issue on the assumption that the more closely we strive to define any field of knowledge, the more we restrict its frontiers. Accordingly, I shall carry out this principle today to the extent of holding myself fully liable to the charge of being unscientific; at least, of being accused of acting as a generalizer rather than as a specialist. For it is my belief that we need not fewer specialized treatises (surely no scholar could take this position) but rather more conscious attempts into a synthesis of knowledge.

BOUNDLESS RESEARCH PROBLEMS

At once, this problem assumes mammoth proportions. Each republic differs from all others, despite certain common points of similarity; furthermore, each republic within itself has much manifest divergencies, the result of tradition, topography, climate and the distribution of natural resources and population, that generali-

* Address delivered by Professor Mears, a member of the U. S. A. Delegation to the Lima Conference, March 30-April 6, 1941.

zation on even a national scale is subject to distinct limitations. Also, if we choose to limit ourselves to what is more geographical than historical, how far does our knowledge extend? Of what phenomena are we best informed? Where are the chief gaps in our understanding of regional conditions? How can we make out a scientific analysis of something which, for reasons beyond our control and to which no blame may be attached, may resemble somewhat the fascinating patchwork quilts handed down to us in the family. Every new idea, every new discovery which has relevant meaning is a gain to us and to the world's civilization. Frequently, perhaps I should say "usually," we cannot estimate its ultimate significance, but there is the unquestioned gain in the accretion of another intellectual product. Again, may I state that the specialist is a great and indispensable factor in our public and private existence, yet if we are willing to face the situation fairly and frankly, I wonder if many of us would dare or deign to expose ourselves to questioning within any one field, upon the assumption that he is a universal geographer, a universal historian, a universal anthropologist or a universal biologist. Thus, within the broad field of geography, there are outstanding leaders in physiography, cartography, meteorology, climatic zones, conservation of natural resources and economic location, but the progress in recent years in local studies not only makes it difficult to keep up with our own chosen field but also we are less and less addicted to generalization. As a result, the gathering, absorption and distribution of knowledge has become a far greater problem than ever before.

My paper today is constructed upon four ideas. First, upon what aspects of Pan American geography do we possess the most meager information; second, what topics of broad interest have the greatest meaning; third, what area is of major importance to the Americas; and fourth, based upon the foregoing, wherein lie most promising avenues of research for future scholars. For lack of available time today I shall not explain how I arrived at my deductions. Suffice to say, the Pacific Ocean, which washes the shores of half the countries of the Western World as well as causing direct and indirect influences likewise to those of the Atlantic and Caribbean, appears to me to have overwhelming significance. One way to test this conclusion is to consider not the influences which are obvious, even to the point of entering our subconscious self, but rather to wonder whether there are *any* features of our

composite life which are not molded in part by the presence of the largest of oceans. To a geographer, there is a penetrating meaning in the enveloping of nearly three quarters of the earth's surface by water bodies. The "Seven Seas" constitute the only world highway, the only one which can claim to be international, and in our exploits of discovery and trade it is truly proper to view the land masses projecting above the water level as the interrupted segments of the oceans, rather than to assume the reverse, namely, that land habitations dominate the sea. This unusual reversal of the maritime perspective accounts for the traditional neglect of the sea by students, public officials, and often by military strategists.

STUDYING THE PACIFIC OCEAN

My plea is for a persistent and widespread study of our greatest ocean, the Pacific, and particularly for countless kinds of research into the vast problems of the South Pacific. Of all regions of the world, we know least about this latter tremendous and vital sector. This may be surprising even to a few delegates here, but the facts are indisputable. Our knowledge of the history, environment and peoples of the South Pacific basin is exceedingly scanty. No area offers richer prizes to the scholar. Nearly every day we hear of some occurrence in the South Pacific, whether it be that of a radical change in this year's course of the Humboldt Current or the discovery of a mariner's journal, which whets our appetite for further information. The area of the South Pacific is so huge that parts of this section of the world have probably never been traversed; only certain sections adjacent to the coastline and islands are known at all intimately. What is needed is both investigations leading to new knowledge and, not less important, a verification of existing records which all too frequently are proving inaccurate. The Pacific Ocean influences the land far more than the land influences this mighty sea.

The interest of the historian needs to be invoked, for in many respects there was a greater knowledge of the South Pacific a century ago than there is at the present time. Scientific work in the twentieth century has been surprisingly scanty; indeed, scientific societies and governments have taken a gratifying interest in Polar explorations, both Arctic and Antarctic, with results which seem likely to modify our interpretation of such topics as storms, ocean currents and weather. The gains therefrom apply to the

dynamics of water surfaces and the atmosphere, yet they extend to the land masses but only thru circulation by way of intervening physical structures and elements. The seas to the north and south of the American continent have been subjected to splendid study by the Norwegians, Germans, Russians, British, citizens of the United States of America, and others, but this South Pacific is largely a guardian of ignorance.

There are numerous reasons why the whole Pacific is so much an unknown area, yet it is less understandable why interested investigators consistently have passed over this region in preference for less available and habitable stretches. Dr. Robert Cushman Murphy, of the American Museum of Natural History, writes thus of the littoral from Panama to Peru: "It is not surprising that the coast is still indifferently charted and much of the description in modern pilot books is distinguished less by accuracy than by a repetitive quaintness from a time long past . . . it is still true that, as regards both place names and verbal descriptions, the latest hydrographic information is a too direct heir of the buccaneering epoch."

THE UNKNOWN SOUTH PACIFIC

Owing to the tremendous extent of the South Pacific Ocean, it appears probable that worthwhile data can be discovered most quickly by a perusal of old, fragmentary accounts of voyages appearing in contemporary newspapers and magazines and even more by studying the logbooks of sea captains. The task is, foremost, to locate records of any kind—not excluding isolated notes of any travellers. It is scarcely two centuries since navigators could avail themselves of the sextant and chronometer, which represented such an advance in the arts of the sea that you may remember that Pigafetta, on Magellan's voyage, mentioned that "at the present time the pilots content themselves with knowing the latitude; are so proud that they will not hear speak of longitude." A decided advantage which the Pacific offers to the researcher is its neglected history and uncharted tracts, compared to the other seas outside the Polar regions. The few good harbors in the East Pacific should signify that more offshore observations are available somewhere. Vast stretches of this briny deep always will remain a mystery. However, leading geographers including Murphy and S. W. Boggs, historians, Commander Charles Wilkes of the United States Ex-

ploring Expedition of 1838-1842, and other students have stressed rightly the rich source material available in the records of American whaling expeditions. The admirable digest by Dr. C. H. Townsend, of the New York Aquarium, of 1665 voyages by American whaling ships for the years 1761 to 1920, illustrates what can be done. A member of several scientific expeditions of the United States Navy told me at Balboa that the logs of American whaling vessels, which operated in the Pacific during the first half of the past century, doubtless still contained the best information on the South Pacific available anywhere.

The international situation of the last few years has caused an unprecedented quest for knowledge of all parts of the world. The weather, which was regarded until recently as mainly an introduction to polite conversation, has become so imbued with strategic importance that nations in strife cherish these day by day happenings as matters of vital concern. Similarly, the forecast of winds, fog, snow and precipitation becomes a closely guarded secret. Nor are magnetic disturbances in their effects upon the radio overlooked. As never before, the physical environment is receiving prominent attention in our newspapers and over the wireless, for it is being forced upon our notice that the welfare of nations and of individuals, of totalitarian as well as democratic states, is governed to a large degree by factors beyond man's control.

During this century, our knowledge of the North Pacific has been increasing rapidly, also that of the unknown Arctic and Antarctic, but for some peculiar reason the South Pacific is a real no-man's land. Schott, the German oceanographer, has done excellent research into certain phases of the Pacific basin, for example with respect to temperature, but our records of many elementary features, such as the movement of tides, and the causes and effects of famous ocean currents are meager and unsatisfactory. Dr. Murphy calls the coast of Panama and 300 miles south the world's most neglected and unknown continental shoreline. The supplanting of Suez by Panama as undoubtedly the most important strait emphasizes the value of learning all we can about this famous cut and its contiguous area.

Let us take an example: Haven't we been somewhat unappreciative of the navigation difficulties along our coasts because we have failed to know the geography of our eddies in currents? Does an eddy 30 km. in diameter, such as Sverdrup speaks of off south-

ern California in summer, affect the atmospheric circulation? Murphy found a connection off Peru between the atmosphere and the eddies; is there a connection off California? How can we plan air routes wisely until we know the pattern of our oceanic and atmospheric circulations? We know the great circular systems but we begin to doubt some of our former opinions about their margins. The margins are critical. The fog margins are only too obvious; there might be others that are not so well defined.

McMillan has said about the birds and the winds that "a bird changing from one current to another is analogous to a man stepping from an escalator moving in one direction to another moving in the opposite direction. There is a distinct shock which is gone as soon as the change is made. The bird, even tho he is flying slowly, is relatively fast for his size and makes the change quickly. Long dirigibles, slow for their size, have been literally sheared apart when straddling strong opposing currents. . . . Horizontal flight requires the most frequent change when the currents are vertical."

McMillan says that "the birds ride the winds," and the birds know the winds so that they might ride them. If we would ride the winds and the waves we must know them, too.

These eddies along our coasts are not uncertain vagaries that we may only dread as a South Sea Islander does a hurricane; they are definite phenomena which at last we recognize, and *eventually* may understand. *Eventually* is an unsatisfactory word in a world like ours.

But eddies are not the only geographic elements that "we see thru a glass darkly." The oceanic deeps: there is almost a rim of them around the Pacific; are they submarine curiosities, merely? Or do they affect currents? If they affect currents, they are significant regarding mines and perhaps submarines. Some of them are deeper than any mountain is high; we know that the mountains do many things; do deeps respond likewise? Gerhard Schott says that deeps, volcanoes and earthquakes are not unrelated subjects.

An Abnormal Year

Conditions of weather and ocean water in 1941 thus far have been unusual. Normally, the annual rainfall at the Canal Zone has averaged about 135 inches on the Atlantic side and half this on the Pacific terminus, but the present seasonal average at Balboa and Panama is running far ahead of normal. Air temperatures and water temperatures are abnormally high for this time of the year.

Guayaquil and northern Peru are experiencing high temperatures and heavy rains, while Buenaventura and other Colombian coastal localities situated in an intermediate position probably will be obliged to add the superlative to its "wet" and "wetter" periods. At Talara, where the oil wells and refineries of the International Petroleum Company are situated, there is more green foliage in this desert area than residents report they can remember. They talk, too, of this interruption in what they regard as a fairly definite seven-year precipitation cycle dating back at least to the disastrous rain and floods of 1925, for which the vagaries of the cold Humboldt Current coming from the West Drift north of the Antarctic were responsible. For some unexplained reason, this mighty current, which is 7 to 8 degrees colder than the adjoining water and has a width of 100 miles off Callao and nearly twice this size off Cape Blanco before it turns westward, has turned unexpectedly this year approximately 300 miles short of its usual northern limit near the Equator.

The situation at Galapagos, one thousand miles from Panama on the shipping route to the South Seas, is striking, for there was an obvious interruption in any seven-year cycle. Owing to the action of the Humboldt Current in its premature turning westward, excessive rains lasting three to five hours have covered the bleak coastline with luxurious foliage; flies and mosquitos abound, baby dolphins are seen in areas which have become stagnant, while birds are dying by the thousands because their normal fish prey are not available. Temperature findings by an expedition from the Field Museum, Chicago, in January and February, are reported to show an average of 82 to 85 degrees fahrenheit, compared with a normal 68 to 75 range; while at one spot 350 miles southwest from Panama and over 400 fathoms of water, there was a recorded surface water temperature of 91 degrees and an average of 87 to 88 degrees, which was in excess of any previous recorded high. The location of these islands on the shipping route from Panama to Australia gives them an importance which transcends that of Darwin's discoveries or their fame as the home of 350-year-old tortoises. Changes in bird life, marine fisheries, and local climates have momentous effects upon the economy of Pacific South America.

INTERNATIONAL COOPERATION

In the Western World, we have the best evidence anywhere of

cooperation on an international scale. This Pan American Institute of Geography and History is one illustration. It is no secret that still further constructive efforts may be undertaken for the mutual good. To this end, the most promising field appears in the possibilities of valuable accomplishments in joint effort along lines of scientific research of a geographical nature. Leading journals are summarizing the spasmodic but notable studies of Latin American and other workers, yet it cannot be said that there is any real scholarly agreement thus far upon such West Coast phenomena as the reasons for, and sometimes even the existence of, strongly contrasting general and local physical conditions of tides, currents or temperature. Peru, situated wholly in the tropical zone, has climatic regions ranging from torrid to frigid. The economic needs of the Western World, and especially of the American Republics, with their large surpluses of raw materials and agricultural products, call for a cooperative research program in the conservation of natural resources as well as in the interest of human and strategic needs.

A LITTLE-KNOWN SUGAR BOWL IN FLORIDA

L. LEMAR STEPHAN
State Teachers College
Troy, Alabama

Sugar was the first food to be rationed in the United States as a result of conditions in the present World War. Why was this necessary? Previous to the War the United States depended on off-shore sugar plantations for 70% of its consumption. After the capture of the Philippines which had been providing 15.41% of our supply (854,000 tons in 1941), when shipping lanes were harassed by submarines in the Caribbean, lend-lease shipments of

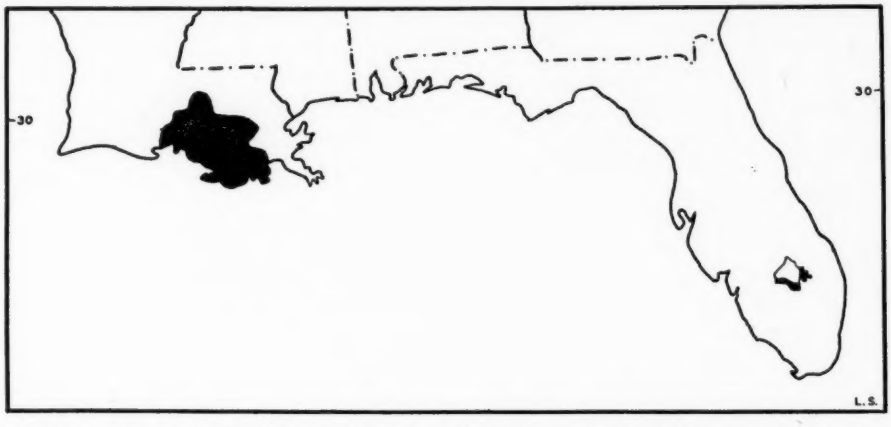


FIG. 1. Vicinity map showing location of south Louisiana and Florida cane-sugar areas.

sugar were made to other United Nations, and sugar was needed for the making of industrial alcohol vital in munitions production, the Government rationed sugar for civilian use in order to guarantee an adequate supply for military purposes. With the quota now lifted for continental beet and cane production, we are interested in increased home production. The Everglades is a newly-established cane-growing region with marked opportunities for expansion on drained virgin peat. In 1942 the United States expects a peak production of 500,000 tons of cane from two cane areas, Florida and Louisiana. About one-fifth of this will be grown in Florida. The United States Sugar Corporation, which at present accounts for more than 95% of Florida's total cane production, announced in its annual report that at the completion of the 1940-41 harvesting season about 91,767 tons of 96° raw sugar were produced from

873,809 tons of cane. A slight increase was expected for 1942. In addition to the continentally-produced cane-sugar, the United States expects to grow in 1942 nearly four times that quantity (or 2,000,000 tons) of beet-sugar in 19 Western states.

Rimming the south shore of Lake Okeechobee from Moore Haven to Canal Point are some 30,000 acres of sugar cane (Fig. 2). This 52-mile crescent, an area of peat and muck soils, constitutes

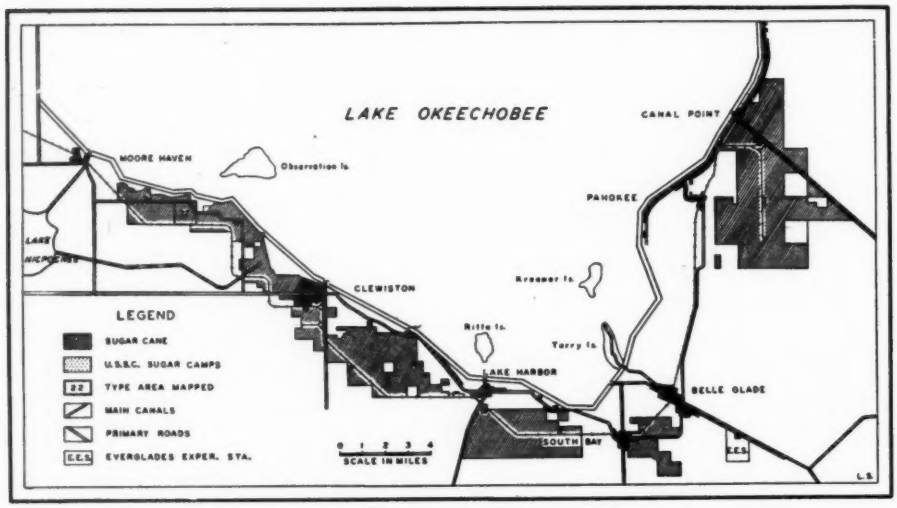


FIG. 2. Distribution of United States Sugar Corporation cane-sugar, as of October, 1940. Note that sections are grouped into "blocks" of cane-sugar near the lake.

a little-known sugar bowl in Florida.[1] There is an eastern division centering about Canal Point and a western division focusing upon Clewiston (Fig. 2). Each division contains about 22 square miles of growing cane. The eastern division is historically based upon a small sugar mill, which in the early twenties operated for a time at Canal Point. Clewiston, begun in 1925, was incorporated in 1932 and made headquarters of the United States Sugar Corporation.

HISTORICAL RESUME

Why is not Florida's Everglades-produced cane-sugar better known? Primarily because of the recent inception. It is interesting

[1] Only at another place, Fellsmere, 80 miles northeast of the Everglades in Indian River County, is cane-sugar produced and refined. Here is a 3,000-acre plantation which produces about 5% of Florida's commercial cane-sugar.

that there were little sugar mills around the St. Augustine and New Smyrna areas as early as 1700. During the 1840's and 1850's several enterprising Floridians undertook the manufacture of sugar. Hamilton Disston's ambitious attempt to establish a sugar empire in the Kissimmee River valley and on the south-west shore of Lake Okeechobee beginning in 1886 was given a death blow in 1894 when the 2-cent per bound bounty on domestic sugar (passed by Congress in 1890 to run until 1905) was repealed. The Disston enterprise had, however, been marked by extravagance and inefficiency, and was further handicapped by insufficient knowledge of sugar practises, especially in respect to water control. In 1923 the first Everglades' commercially-grown cane was tried at Canal Point, the little sugar-house having been brought there from West Palm Beach by canal barge. A little later a sugar-house was moved from Hialeah (near Miami) to Clewiston. The Southern Sugar Company acquired both the eastern and western sections of cane land, which since 1931 have formed the nuclei of the United States Sugar Corporation holdings. Failures of predecessor companies were attributable in part to a lack of complete

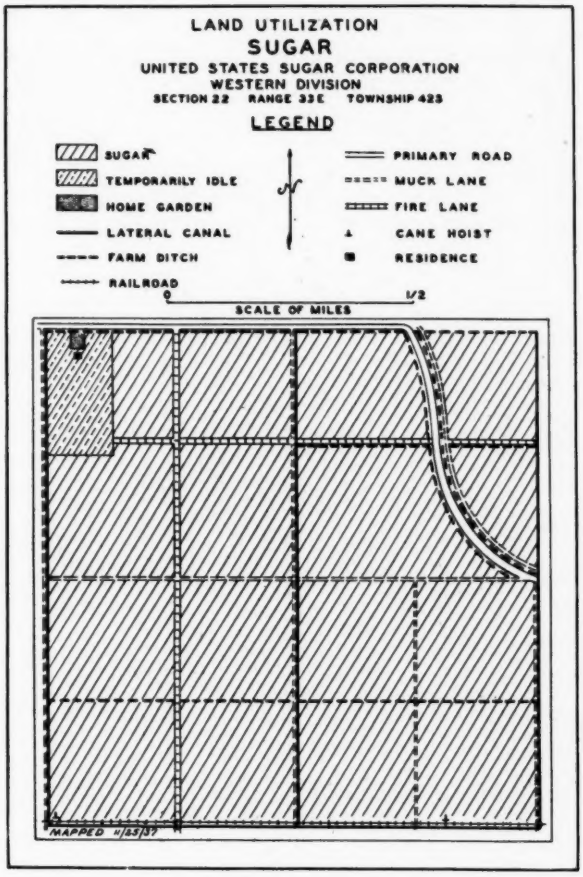


FIG. 3. The rectangular pattern of land use in the Everglades and other details of cultural items associated with cane growing is represented in this section near Clewiston.

water control, suitable varieties of cane and proper cultivation practises, and in part to unstable conditions in the world sugar market.

Successful cane production has been furthered by three experiment stations which have bred new varieties of cane and determined optimum water control, fertilization, and other cultivation procedures. The only Federal Cane Breeding Station within continental United States was established at Canal Point in 1922. In 1923 Florida located an experiment station at Belle Glade, which has worked with cane as well as with winter vegetables, cattle, and other farm products peculiar to the Glades. The research laboratory of the United States Sugar Corporation at Clewiston, at present headed by Dr. B. A. Bourne, internationally-known cane specialist, has directed sugar experiments with unusual success.

Cane is bred to obtain healthy crosses and varieties which are resistant to diseases, as mosaic, corn aphids, eye spot, red spot, and brown stripe. Late- and early-maturing varieties are both desirable to extend the harvesting season and frost-resistant cane decreases the damage caused by low temperatures during winter nights.

THE PHYSICAL BACKGROUND

In comparison to the Louisiana sugar area, southern Florida's more tropical location and quasi-insular character is more favorable for the tropical plant, sugar cane. Few winter freezes and a longer growing season make annual replanting of cane fields unnecessary in Florida. Usually fields are replanted about every fourth year.[2] Sugar cane around Lake Okeechobee, does, however, meet the economic competition of another major crop, winter-produced vegetables. Only the tip of Florida south of Lake Okeechobee has tropical temperatures with wet summers and early autumns and a dry winter season (Koppen, Aw). Near ocean waters provide for an ample supply of moisture with east-southeast summer on-shore winds.

The climatic graf (Fig. 4) shows the distribution of seasonal rainfall and temperatures. A rainy and hot season provides auspicious conditions for growth of stalk, while the cooler and drier period induces high sucrose content by harvest. From the weather records of the Everglades Experiment Station, 1924-1937, G. R. Townsend (Associate Plant Pathologist) has computed that 17%

[2] United States Sugar Corporation, Sugar and the Everglades, B. H. Tyrrel Press, New York, 1939, pp. 24-26.

of all frosts occur between November 5 and December 15, 67% between December 15 and March 1, and 16% between March 1 and April 29. What is the extent of damage by frost on cane? An example is given by Dr. Bourne:[3] During the nights of December 11 and 12, 1934, with minimum temperatures of 27° and 21° F., respectively, cane was frozen. But for 75 days the Clewiston sugarhouse ground the frozen crop and the average sugar yield for this period was over 6.5% of 96° test. "... the suitability of this region for growing sugarcane types adaptable to prevailing environmental conditions has been amply demonstrated."[4] (P.O.J. 2725 variety occupied the greatest acreage at that time. Some local tempering of cold waves results from proximity to Lake

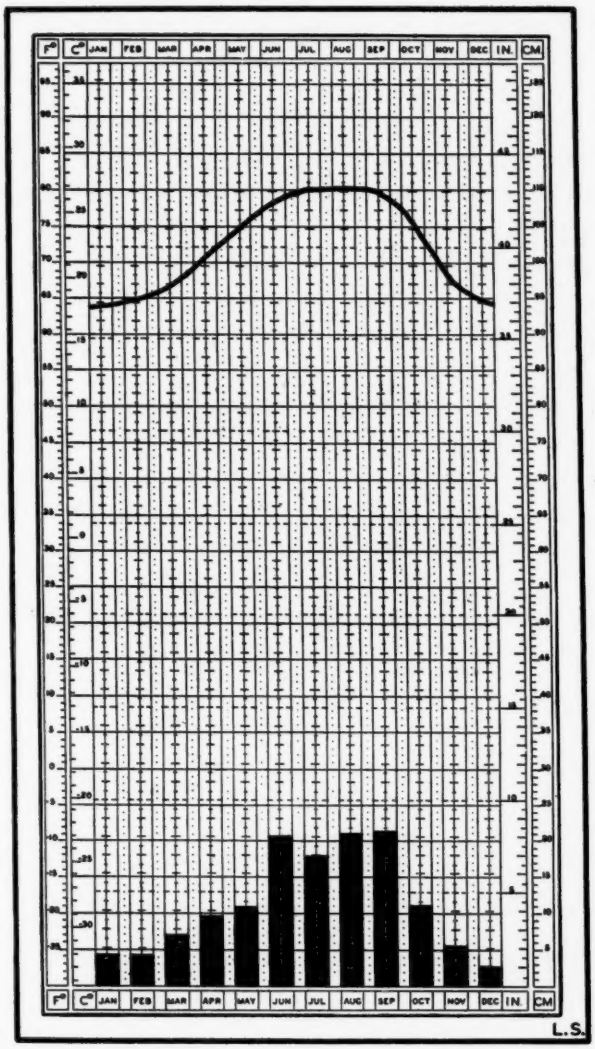


FIG. 4. Statistics for the rainfall and temperature curves were accumulated from six climatic stations encircling the east and south shores of Lake Okeechobee. A *type* curve for the northern Everglades was thus made.

[3] B. A. Bourne, Effects of Freezing Temperatures on Sugarcane in the Florida Everglades, Technical Bulletin #278, Agricultural Experiment Station, Gainesville, Florida, 1935, pp. 3-12.

[4] *Ibid.*, p. 5, and in interview.

Okeechobee waters and from water seepage thru porous soil horizons. Because of the warming influence of Lake Okeechobee on adjacent shores, cane growing on colder saw grass soils (those farthest from the lake) are harvested first. Later in the season cane is cut near the lake on "Custard Apple" muck soils, finally medium to late varieties are harvested from the saw grass peat.[5] Different canes are grown on these two soil types; the yields of two varieties produced on muck average 55 tons per acre-year, while saw grass canes average about 30 tons. Florida-bred canes have now taken precedence over Java canes, which were widespread in the middle thirties.

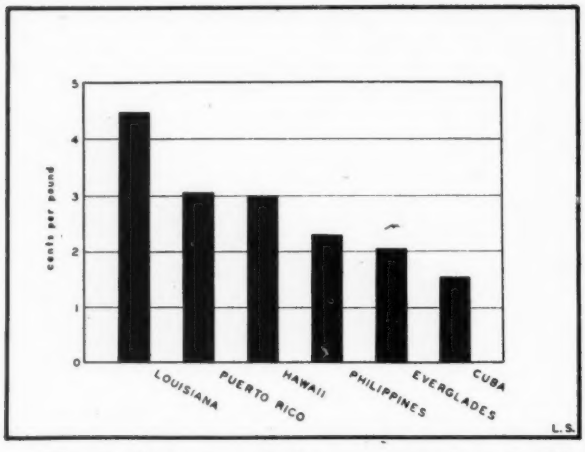


FIG. 5. Cost of producing raw cane-sugar in different areas supplying United States consumers. The relative position of the Everglades on the low-cost side of the graf suggests a future greater cane production.

The flat, treeless terrain offers advantages for a mechanized plantation system of farming, such as practised by the United States Sugar Corporation, but at same time it offers problems and expense in securing adequate drainage. Surplus water is drained thru the several arterial canals of the Everglades Drainage District. Local water control is provided by sub-drainage districts bordered by embankments, together with a system of lateral ditches spaced at one-half mile intervals, which are linked by a close network of field ditches and "mole" drains. Two-way pumps force water from the fields or return it to the fields in underground irrigation as needed. For cane the ground water table is held at a depth of between 2¾ and 3 feet.[6] This is deep enough for good anchorage of the plant. Fertile muck and peat soils with a high lime, nitrogen, and humus content permit high average yields of

[5] F. D. Stephens, of the Everglades Experiment Station, Belle Glade, Florida, in interview December 3, 1937.

[6] F. D. Stephens, Agronomic Studies with Sugarcane, Annual Report for Fiscal Year Ending June 30, 1939, Agricultural Experiment Station, Gainesville, Florida, 1939, p. 162.

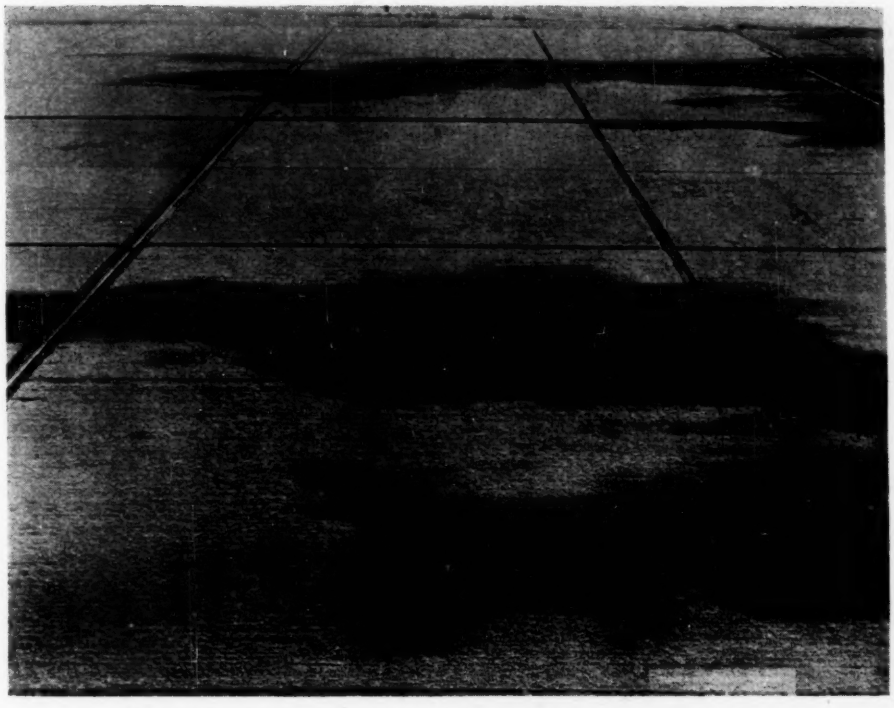


FIG. 6. Aerial view of approximately 5,000 acres of solid sugar cane plantings on plantations of United States Sugar Corporation in the Florida Everglades.

35 tons of cane per acre, in contrast to an average Louisiana yield of around 20. The vast Everglades low-moor was developed from past and present accumulations of sub-tropical grasses, reeds, and sedges, of which the present soil consists. Sawgrass (*Cladium effusum*), a sedge, is the dominant floral variety present.

The combination of natural advantages results in low-cost cane, substantially lower than continentally-grown beet-sugar or cane produced in Louisiana, and but little higher than Cuban cane. (Fig. 5) That a small but stable sugar economy is now operating successfully in the northern Everglades, in spite of the physical limitations of occasional cold waves and hurricanes (high wind and flooding), is patent.

HANDLING THE CROP

Adequate water control methods and suitable physical equipment are both vital for successful cane culture in the Everglades marsh. The plows used to prepare the land for planting are drawn

by crawler tractors. The saw grass is cleared, the soils aerated by rotary plowing and then the raw fibrous peat is allowed a "resting" period before it is furrowed and planted to cane. Seed cane is dropped by hand into the deep furrows and then covered by discs and drags. After the cane begins to grow, weed growth is destroyed by cultivating discs until the cane is too tall for tractors to be used. Several weedings with hoes are necessary before the ground is entirely shaded by cane leaves, at which time weeds cease to appear between rows. Because of the tropical climate, it is unnecessary to replant the fields each year, new stalks growing from old roots after the mature cane is cut. These are known as "ratoon" crops.

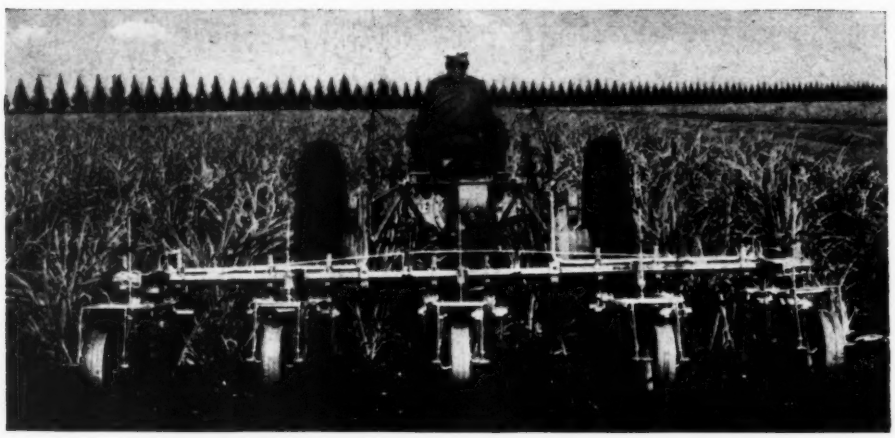


Fig. 7. Mechanical cultivation of young sugar cane to keep down weed growth. Australian pines line road in background.

Approximately every fourth year it is necessary to replant the fields to maintain desired yields. The landscape pattern of a square mile of Everglades cane is represented in Fig. 3.

In 1936 the harvesting season in the northern Everglades lasted just 133 days; now the season has been extended to around 180 days (from early November until the last of April), consequent upon the propagation of both early- and late-maturing varieties, as well as frost-resistant and disease-resistant varieties. When ready for harvest the cane is cut, stripped and topped with long knives called "machetes," purchased and handled by Negroes. The stripped stalks are placed in piles to be loaded into field wagons and conveyed to the railroad loading hoists. Here the cane is weighed, loaded into the cane cars and hauled to the Clewiston sugar-house. The cars are emptied by being tilted on a special

FIG. 8. Loaded cane wagons being transported from field to one of the many railroad loading hoists.

table, the cane sliding onto a moving belt which conveys it into the factory.

The cane then passes under a set of knives and is partly shredded. The first crushing by use of a 20-roll tandem destroys the cane structure and some of the juice is removed. The cane then passes thru a series of mills which extract most of the juice. The residue, bagasse, is burned under the boilers to furnish the steam necessary for plant operations.

To the strained juice a small amount of lime is added to further clarify it and neutralize its acid condition. The impurities settle out and the clear heated juice passes to the evaporators, where it is boiled down to a very heavy syrup under a partial vacuum. The "blackstrap" molasses is sold for use in cattle feed or to make alcohol.

As the syrup increases in thickness, small and then larger crystals appear. Once in the revolving centrifugal machines, sugar crystals are separated from the syrup ("mother liquor"). Finally, this brown raw sugar is automatically weighed, sacked in 325-pound bags, and shipped to Savannah for further refining into the "white crystal" state.

VALORIZATION

Of major significance among economic considerations of cane-sugar production in recent years is the quota legislation which has served the two-fold purpose of "pegging" prices and limiting production. The quota system provides for a more positive control of the open market price than a simple tariff method; however, it may

be stated that valorization schemes are usually successful for only a short period of time.

Almost from its inception the Everglades sugar industry has come under quota restrictions; thus it is conjectural how much cane would normally be growing now. Even under the Jones-Costigan sugar quota-tax-payment programs begun in 1934, the Everglades sugar production has more than doubled (Table 1).[7] The Sugar Act of 1937, which authorizes sugar import and marketing quotas, conditional payments to domestic sugar producers and an excise tax

TABLE 1
PRODUCTION TRENDS IN THE EVERGLADES

Harvest	Tons of cane	Tons of 96° raw sugar	Yield percent sugar in cane	Tons of cane per acre	Tons of 96° raw sugar per acre
1928–29	12,696	745	—	—	—
1929–30	202,011	14,468	—	—	—
1930–31	351,051	26,645	—	—	—
1931–32	292,228	23,913	8.11	22.53	1.83
1932–33	410,882	36,501	8.89	34.31	3.04
1933–34	452,797	40,184	8.91	34.90	3.05
1934–35	350,742	25,791	7.35	29.02	2.14
1935–36	451,369	39,268	8.72	35.55	3.09
1936–37	529,156	48,736	9.21	35.29	3.24
1937–38	582,834	53,246	9.13	35.02	3.09
1938–39	805,455	85,663	10.66	38.56	4.11
1939–40	663,232	65,101	9.32	37.90	3.72
1940–41	873,809	91,767	10.50	33.73	3.54

on sugar, was extended at the end of 1941 until December 31, 1944. Title 2 of the Act, however, which contains the quota provisions (allowing Florida 0.94% of total United States consumption), was suspended by presidential proclamation on April 13, 1942. Since then, the Department of Agriculture has encouraged maximum production on the part of growers, and for that reason it gave its support December, 1941, to a 33⅓% increase in the base rate of payments to domestic cane producers in order to stimulate sugar output in our country under wartime conditions.

Significant expansion of sugar cane acreage in Florida is limited by grinding facilities. President Clarence R. Bitting, of the United States Sugar Corporation, stated in April, 1942, that further cane production should not be encouraged until priorities on construction materials be granted for an additional sugar mill. A cane

[7] Hearings Before the Select Committee Investigating National Defense Migration, House of Representatives, Part 33, Washington Hearings (with Florida and New Jersey Supplement), U. S. Government Printing Office, Washington, 1942, pp. 12958, 12962.

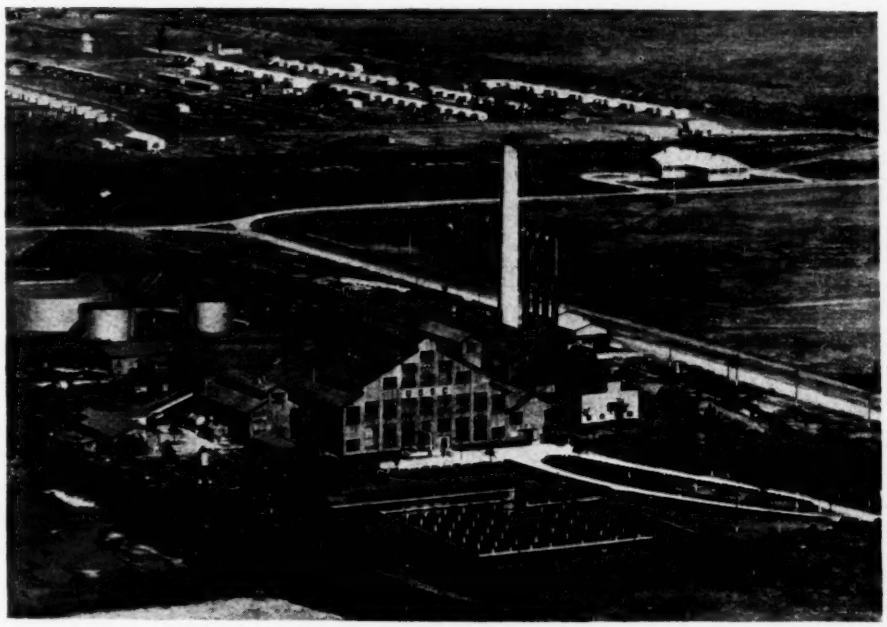


FIG. 9. Aerial view of the Clewiston sugar-house.

growers' cooperative association, backed by Senator Claude Pepper of Florida and composed of independent growers, hopes to plant some 2,000 acres during 1943-44. This acreage will feed a small grinding mill, to be transferred from Louisiana.

LAND TENURE

The United States Sugar Corporation at present accounts for more than 95% of Florida's total sugar production. Of the cane processed at the Clewiston sugar-house, about 90% is grown by the Corporation. Some 28 independent growers, having price contracts (based upon the sucrose content and price of raw sugar), sell their cane to the Corporation. The land policy of the Corporation has been to block its holdings into contiguous areas served by the same drainage system. An exchange of "outlying land" for smaller pieces of "drained land" has steadily been made. As of June, 1941, the Corporation had 46,758 acres in fee, 2,189 acres under lease, and 83,192 acres under option.[8] Altho much of this idle land is at present an economic burden to land in cultivation, it is representative of the rather easy acquisition for "economic land" in a newly-reclaimed area not thickly crowded by land

[8] *Ibid.*, p. 12960.

owners. Mere space has been cheap for individuals, but production costs high; thus the plantation type of land tenure is the usual economic adjustment here. Perhaps the recently-organized growers' association will, by pooling capital and other cooperative measures, be able to meet the problems as successfully as the United States Sugar Corporation.

GROWING COSTS

Growing costs for cane have averaged around $1.88 per ton (Table 3). Cultivation and maintenance of fields, amortization of cane plantings, depreciation of field equipment, taxes on cane growing lands, and other items make the growing costs the highest.

TABLE 2

NUMBER OF PLACEMENTS ON OUT-OF-STATE CLEARENCE ORDERS (1941-42 SEASON)

Alabama	203
Arkansas	42
Georgia	133
Mississippi	388
Missouri	112
South Carolina	209
Tennessee	450
Total	1537

The United States Sugar Corporation has met its year-round labor requirements by constructing eleven Negro villages to house about 2,500 workers (Fig. 2). For the seasonal work of harvesting, Negroes recruited from the lower south (Table 2)[9] during the cotton slack period have been so successful that the Company recently estimated that 85% of its seasonal laborers were past employees. Some 1600 migrant Negroes annually cut cane, then return to the cotton fields. All harvest hands are paid on per ton per day basis. Groups work as crews. A good harvest hand can earn more than $3.50 per day, and thus excluding Sundays, can earn $84.00 per month or about $500.00 for a 175-day harvesting season. A labor shortage has made its appearance, since the transfer of many permanent and seasonal employees to the armed forces, and with war-time greater opportunities for work in home farm areas and in cities. The Corporation has on hand several huge mechanical cane cutters; six have been reconditioned recently and are operating to replace about 10% of the diminishing labor force. Vegetable harvesting, with higher wages and shorter working hours, competes with cane cutting for "floating" labor. Labor costs rank second to growing costs.

[9] *Ibid.*, p. 12968.

Cane, a heavy, bulky product, necessitates a well-integrated system of transportation from field to sugar-house. In a recent year, the United States Sugar Corporation operated 127 tractors and 412 wagons (all equipped with crawler-type tracks). Over 260 miles of farm roadway (muck lanes) and 345 bridges were operated. Railroad equipment in use in 1936 included 6 locomotives, 245

TABLE 3

CANE COSTS (1938-39)[10]

Items	*Per ton*
Growing	$1.88
Labor	1.02
Transportation	0.51
Total cost administration cane	3.41
Total cane purchased	3.70
Total cost all cane delivered to sugar house	3.44

cane cars, 10 sidings and trackage at Clewiston and Canal Point. There is no grade problem for roads and railroads in the Everglades.

THE PROSPECT

In producing raw sugar-cane, only Cuba has lower total costs than the Everglades. As is shown in Fig. 4, even Philippine costs were higher. No federal subsidy or protective tariff is, then, necessary for continuance of Florida sugar growing.

What are the other considerations? There is much space available and this peat when drained, made accessible, and populated is not marginal or "negative" land. The draining of land costs from $25.00 to $40.00 an acre in addition to the price of virgin land; annual operating costs, depreciation, etc., thereafter, total from $3.00 to $5.00 per acre. A substantial segment of land has recently been made accessible by the construction of a highway extending southward from South Bay and improved by enlarging the canal which parallels the highway. New farms are appearing at an increasing rate. According to Dr. J. R. Neller, in charge of the Everglades Experiment Station, about 500,000 acres of the Everglades could potentially be farmed.

Large-scale farming is more profitable and more stable than small farm units in this flat, treeless country. Growers' cooperatives operating mechanized farms, comprising as much as several sections, could minimize the fluctuating yearly returns. With sugar

[10] United States Sugar Corporation, Eighth Annual Report, June 30, 1939, B. H. Tyrrel Press, New York, 1939, p. 26.

acreage restrictions lifted, it seems highly probable that many farmers will change from growing vegetables to planting cane, if additional grinding machinery can be transferred to the area. Thus the Florida Everglades gives promise of becoming a more important sugar bowl.

THE BALTIC SEA—COMMERCIAL BLIND ALLEY

W. O. Blanchard
University of Illinois

Among Europe's major coastal waters the Baltic ranks as most unusual in but two respects. These are (1) the shallowness of its bed, and (2) the freshness of its waters. As an economic asset it makes but a mediocre showing. The climatic influence exerted upon the bordering lands is small; in the value of its fisheries the North Sea is vastly superior, and in commercial shipping both the North Sea and the Mediterranean are far more active.

Yet, in medieval times the Baltic played a much more important role in European economy. Thus, the flourishing trade of the Hanse cities which reached its peak about 1400 had as one of its corner stones the great Baltic herring industry. Likewise, while the Vikings were making commercial history, Baltic shipping ranked second only to that of the Mediterranean.

Is this change in its fortunes a real decline or is it purely relative? What are the physical characteristics of this north European "Mediterranean" that have dimmed its glory?

A Series of Shallow Basins

The larger features of the Baltic find their explanation in the geologic origin of the basin. Unlike the Mediterranean, Black and Caspian, produced chiefly by vigorous folding and faulting, the Baltic, like the North and White Seas, was formed by the slight downwarping of a plains area.

As might be expected a very shallow basin is the result. The average depth is estimated at about 180 feet. For the Mediterranean the corresponding figure is over twenty-five times as large. Considerable areas of the Baltic are less than 120 feet deep and at least one extensive submarine moraine between Bornholm and Rügen is covered by only 20 feet of water—a menace to navigation

and a serious handicap to trawling. Furthermore, the Baltic bed is not a single continuous depression but rather a series of basins separated by sills. Most of the latter are subsurface but several project above the water as islands or peninsulas, e.g., Jutland with the adjacent islands, also the Ahvenamaa (Åland) group. A mod-

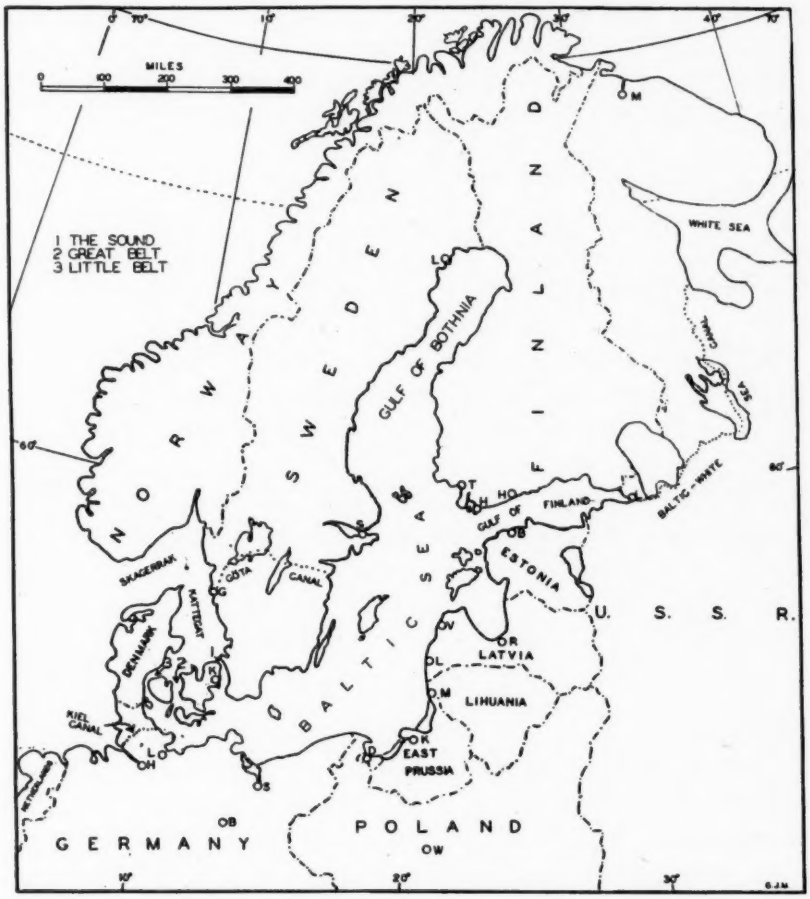


FIG. 1. Sketch map of the Baltic Sea region.

erate fall in sea level would transform the Baltic into a chain of lakes.

Of special interest is the sill marking the junction of the North and Baltic seas. This leaves a water connection between the two so narrow and so shallow—as little as 23 feet in depth—that in many respects the Baltic may be considered an enclosed lake. While the

shallowness is favorable for fish it, together with the ridges, restricts the free circulation of water at depth. The entrance sill is especially effective in preventing a large inflow of salt water, tho there is some movement near the bottom.

The surface current that margins the Baltic moves in an anticlockwise direction and is important in modifying the shore line. There is a large outflow of surplus water into the North Sea except when checked by strong winds. Like the Mediterranean the constricted opening makes the Sea practically a tideless basin, the range at Copenhagen being scarcely one foot.

Waters, Remarkably Fresh

The limited intake of salt water, the large drainage basin—about one-fifth of all Europe—together with the abundant precipitation and the limited evaporation due to cool temperatures—all these have combined to keep the salt content small. The average for the Baltic is only about one-third that of the ocean. The salinity decreases with distance from the ocean and increases slightly with depth. However, there are no very deep basins of stagnant salt water here such as are found in the Black Sea. The salt content varies with the winds, currents and the volume of tributary streams. Unlike the Mediterranean it is nowhere sufficient to justify recovery from sea water. Lübeck whose early growth rested in part upon its salt production for fish packing got its supply from inland deposits, not by evaporating sea water.

Contrasting Coastlines

Geologic history has largely determined the character of the coast. Extending as it does for some 5000 miles there is bound to be considerable variety. In general, however, the coasts bordering Finland and Sweden, north of Skane, have been shaped by vigorous glacial *erosion* of the *ancient* rocks of the Baltic Shield. The rest of the coast represents *depositional* features by the same ice, upon more recent *sedimentary* rocks. The erosion coast is more irregular, with many rocky promontories and islands, the latter sometimes bare and rounded, others forested. Around the head of the Gulf of Bothnia there is, however, an exception for here the relief is small and on the east or leeward side sand dunes line the coast.

Of the deposition coast that between the Oder River and Finland is a low lying beach with long stretches of dunes and shallow water—an uninviting shoreline. Original indentations have been

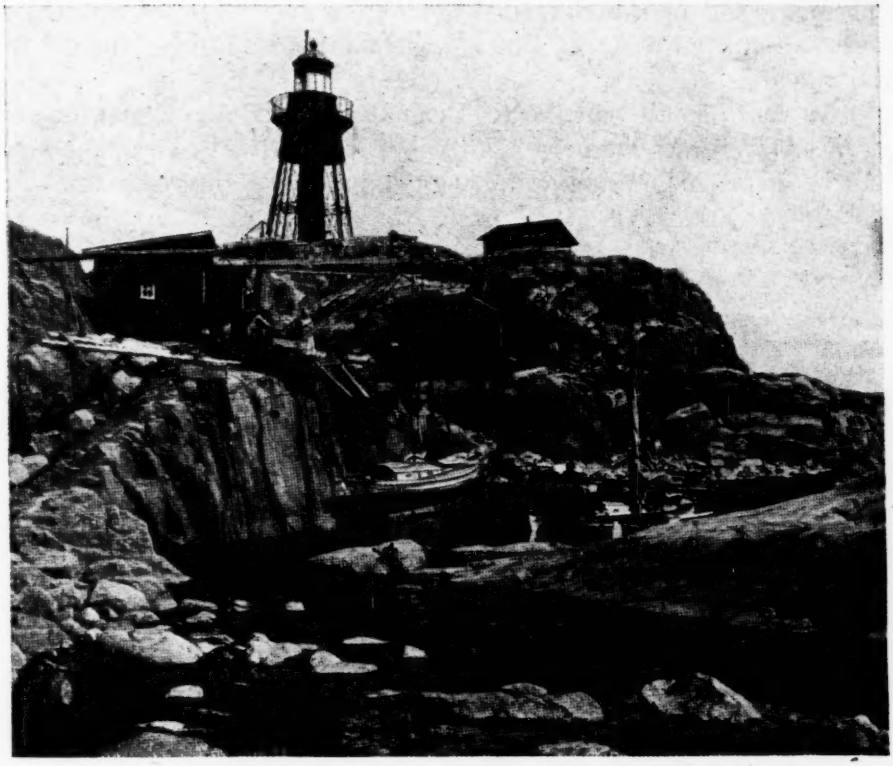


FIG. 2. Severely eroded crystalline rocks on the Swedish coast of the Kattegat north of Skane. (Courtesy Svenska Turistföreningen)

mostly closed off by spits and barrier beaches. In the absence of tidal scour river mouths have tended to silt up and there are almost no good harbors. Most of this coast seems deserted and commercially stagnant. West of the Oder local subsidence has produced more irregularities.

A BLIND ALLEY

The Baltic is, after all, a commercial "blind alley." Shipping enters it almost entirely for what the *local* hinterland has to offer. The Baltic-White Sea Canal has, to be sure, provided a rear exit, but it is frozen for six and one-half months, it cannot accommodate vessels of over 3000 tons displacement and its nineteen locks make transit slow and expensive. It was built chiefly to stimulate the development of the Karelian Isthmus and Arctic Russia and their products will move via the canal and the Baltic—900,000 tons during the first season. However, that region has definite limitations.

The canal has merely extended the "blind alley"; it has not made the Baltic a "thru route" in the way that Suez did for the Mediterranean.

At the opposite end the Kiel Canal provided a real "front entrance." With a channel of 36 feet in depth it can accommodate most vessels including capital war ships, and it is a shorter and

FIG. 3. Glacial erosion on the Swedish coast of the Gulf of Bothnia. Note the rounded profiles and the many forested islands. (Courtesy Svenska Turistförenigen)

safer route than that around Jutland. Of the three *natural* entrances to the Baltic, the Sound is the shortest and most direct. However, its southern part will pass only ships with less than 23 feet draught. The Great Belt is better for larger steamers for very careful piloting can utilize a depth of at least 36 feet. The Little Belt is both tortuous and narrow in places altho it has a minimum depth of 36 feet also. Altho built mainly for strategic purposes the Kiel Canal has a large peace-time traffic—about two-thirds that of Suez or Panama. The Göta Canal from Stockholm to Göteborg is a short cut across Sweden but it is too small to be of commercial consequence.

CLIMATIC LIMITATIONS

The northerly location restricts the potential insolation for the Baltic to only one-third that possible at the equator. Furthermore,

cloudiness is high. On the other hand it benefits from the tempering winds off the Atlantic altho the Kjolen Mountain barrier minimizes this effect for the northern Baltic just as submarine sills and islands restrict water interchange with the ocean. In summer the long days partly offset the weakness of the sun's rays but the reverse is of course true in winter.

In general the Sea and its margins have a wider temperature range than the North Sea and the climate may be said to be intermediate between oceanic and continental. In January there is a temperature anomaly of about +10°C.; in July, it varies from 0°C. in the southern part, to +5°C. in the extreme north of the Gulf of Bothnia. The January surface temperatures north of Jutland (0°C.) are similar to those of the Gulf of Alaska, but some 30°C. warmer than Hudson Bay, all of these three locations being in the same latitude.

Of special interest to Baltic shipping is the handicap of winter freezing. The extreme shallowness, low salinity, restricted communication with the ocean and the mountain barrier of Scandinavia—all these combine with high latitude to favor extensive ice formation. The seriousness of ice blockage varies from place to place and from winter to winter. Like our Great Lakes the main difficulty lies not in complete freezing of the Sea but in ice covered harbors. Thus, northern Gulf of Bothnia may be covered for as much as 7 months; the Gulf of Finland, for 4-5 months. The German open coast is seldom frozen, but the ports are usually closed. Lübeck is ice bound for 32 days, Stettin, 61 days, and Memel (inner harbor), 142 days. The Vistula is usually closed for 3 months. Leningrad would be cut off for 3 to 5 months, without ice breakers, but at the outermost opening of the Gulf this is reduced to 2-3 months. Turko (Åbo) is kept open by ice breakers. In a mild winter Liepāja and Ventspils on an exposed west facing coast may be entirely free. As a rule almost all the ports inland from the Kattegat are closed part of the winter. Only a few times in history, however, has any ice bridge completely joined Sweden and Denmark.

Fisheries, Past and Present

As mentioned above, Baltic herring at one time was a large factor in the prosperity of this region. Each summer huge shoals of these fish entered from the North Sea to spawn. However, between 1417 and 1425 the catch declined sharply and the fish have never since appeared in such large numbers there. The reasons for

their disappearance has long been a debated question. The most probable explanation offered is that ever since glacial times the Baltic has been growing fresher. Finally it became unsuited for herring spawn and the fish forsook the Baltic for the North Sea. The Hanse loss became the Dutch gain.

Hinterland of Restricted Productivity

The regions commercially tributary to the Baltic are not, on the whole, highly productive. They are mostly forested. The soils are generally poor, the growing season, short, the population, sparse, and agricultural surplus, small. There is much waterpower in Sweden and Finland, but the only important mineral output is the Lapland iron ores which, during the summer open season move to Germany and the other North Sea regions via the Baltic.

Commerce Small

As a consequence of the limitations of both the sea and its hinterland commercial intercourse with the non-Baltic world is restricted. True, something has been done to overcome in part these natural handicaps. Ice breakers lengthen the open season of some ports. Much dredging and building of breakwaters have created harbor ports of fair importance. Canals have improved the connections with the outside oceans. Likewise, thru drainage, fertilization, scientific methods and cooperative effort, agriculture has been much improved—especially in dairying. Forests have, especially in Finland and Sweden, been intelligently exploited and water power resources developed.

Of the cargoes leaving the Baltic the bulk is made up of wood, including pulp and paper, iron ore, flax and dairy products. Returning tonnage, mainly manufactures, is much smaller. Formerly incoming coal helped to balance the trade but in recent years Silesia has furnished a local supply.

In medieval times, however, as stated above, the Baltic was far more active. The narrowness, the shallowness and the many islands were then assets rather than handicaps to sailors. Navigation instrument aids were few, winds provided the motive power and ships were small so deep harbors were unnecessary. Fish resources, then so abundant, were a powerful magnet for shipping.

The geographic discoveries of the 16th and 17th centuries moved the commercial center of gravity from the coastal seas to

the open ocean. The Baltic, like the Mediterranean, lost its leadership to the Atlantic. Altho even as late as 1830, two-thirds of Germany's total tonnage belonged to the Baltic, one-third to the North Sea, in 1910 the corresponding figures were one-tenth and nine-tenths respectively and there has been little change since then.

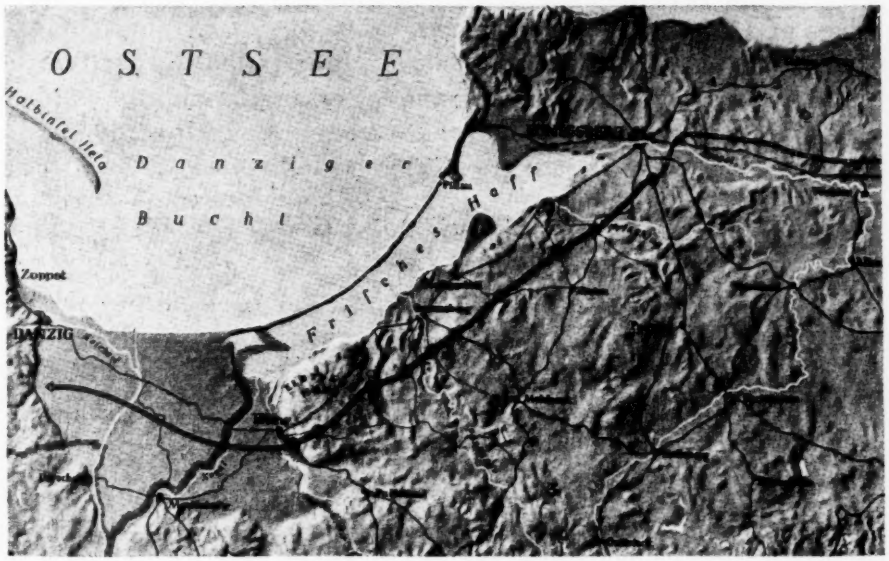


FIG. 4. Deposition coast of East Prussia—the free city of Danzig occupies a part of the delta of the Vistula. The shore current has carried deltaic material eastward building a long spit which almost closes off a large lagoon, Frisches Haff, and the Pregel River. The double line is one of the new concrete highways built just before World War II.

Ships leaving Königsberg, capital of East Prussia, must go 4 miles down the Pregel River, thru a crooked 22-mile channel across the lagoon and out at an opening in the spit at Pillau. Vessels are limited by the channel depth—25 feet—and by ice from November to March. (Courtesy Volk und Reich, Berlin)

STRATEGIC CONSIDERATIONS

The Baltic is the "tie that binds" together some nine independent states and one international city. For five of these countries it is their only water outlet; for the other four it is one of two. For all, its uninterrupted navigation is important, for several it is vital.

The all-important feature that gives the Baltic its great strategic value is its limited communication with the ocean. For much of its history the Sea has been dominated by one or the other of the bordering states or association of states or cities. The Hanse

towns controlled shipping and collected tolls on boats passing the Kattegat; with the league's decline Denmark took over and collected dues till 1857.

The low density of Baltic waters together with their shallowness has introduced special problems of navigation for submarines. Even surface craft would have to lighten their cargoes by about 30 tons per 1000 tons of displacement when entering from the ocean if they were to maintain their normal water line. Navigation by small submarines with their limited degree of floatability is a delicate matter. On the other hand the waters are usually muddied by the numerous inflowing rivers so that visibility below the surface is restricted thus giving welcome protection to submerged craft.

The small countries about the Baltic are essentially buffer states between Germany and Russia and as such they are suffering the penalty of such a location. The Soviet encroachment upon Finland, Esthonia, Latvia and Lithuania is a resumption of its age-long struggle for open water. The possession of Hangö and Baltiski at the mouth of the Gulf of Finland reduces the period of ice blockage from five months at Leningrad to two or three months at the newly acquired outlets.

MAP READING

ELAINE FORSYTH
Ithaca, New York

LESSON VI. THE MERCATOR MAP

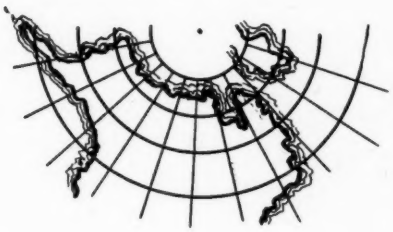
Today we are going to study the most famous and best known of all world maps. It is the one type of map that practically everybody recognizes. We are so used to it that sometimes other types of world maps make us feel faintly uncomfortable—as if they weren't quite right. Yet many of us have never looked even at this map with close attention.

The story of how we got this map is interesting. In the 16th century the Portuguese and Spanish were making long trips of exploration across the Atlantic and along the coast of Africa. They needed accurate maps to tell where they were and to chart new lands. Emperor Charles V of Spain hired a mathematician named Gerhard Kramer to make maps for his sailors. The name Kramer means "merchant" in German. In Latin the name became *Mercator,* and we call his maps by the Latin name to this day. The Mercator map was first published in 1659.

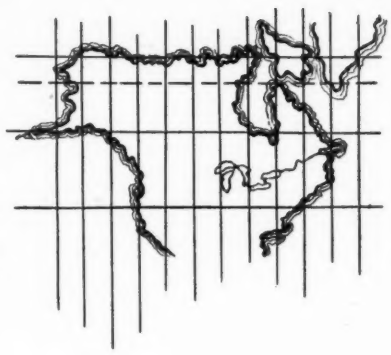
Look at the map. It is one of the *cylindrical projections,* that is, made on a cylinder which is supposed to be wrapped around a globe touching at the equator. You have already learned that a cylindrical map cannot have a north or south pole. Refer to Lesson V.

All the parallels are straight lines, and parallel to each other. So far it looks like the arrangement of lines on a globe. But now look at the meridians. They also are straight lines parallel to each other. This is not according to the way they are on the globe. They should all meet at the North and South Pole. Compare the meridians on the map with the meridians on the globe. What do you suppose happens to the land and water at the north and south of this map?

It should look like this:



But it looks like this, instead:



It is stretched out too large. Greenland is a good example. On the Mercator map it looks to be larger than South America. It is only about one-fifth as large.

This is how the sizes compare.
If Greenland is shown this size on a Mercator map.
This is the size it should be.

On the Mercator map Alaska appears to be one-half as large as the United States. Really it is about one-fifth as large. Compare Canada and the United States. You now have in mind one important fact about the Mercator map. It has very great distortion at the far north and far south. Land and sea areas appear to be very much larger than they are.

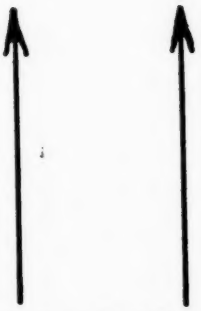
The small map you are using has a scale. What does it say? *Equatorial Scale in Miles.* If you measure the graphic scale you will find that one inch represents about 3000 miles—*on the equator.* Does one inch represent 3000 miles at 80° N. latitude? Of course not. Remember the earth is a sphere, even if this map doesn't show it. The distance around the earth at the equator is 25,000 miles. The distance around the earth at 80° N. latitude is about 4000 miles. Perhaps two of you had better take a piece of string and measure these on your globe. Then transfer the distances from your string to the blackboard. You won't have any difficulty seeing the great difference. Yet on this Mercator map both these—the

equator and the 80th parallel are the same length. It should be clear that you can't use the same scale at the equator and the 80th parallel.

We have said that on most maps 1 degree of latitude equals about seventy miles. If that is true the distance from 0° to 20° should be 1400 miles. The distance from 60° to 80° should also be 1400 miles. And certainly both 1400 miles should be the same length on the map. Measure and see:

0° to 20° N. = inches = 1400 miles
60° N. to 80° N. = inches = 1400 miles

This is one of the most interesting things about this map. Mercator realized that it was bad to have the meridians parallel when they should be curving in at the poles. It stretched everything sidewise.

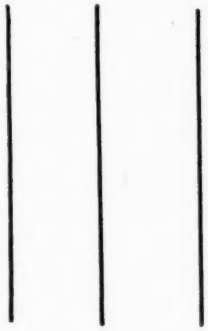


He must have decided to do something to improve his map. So every time the meridians were supposed to curve in toward the poles (and didn't) he stretched the parallels father apart, too. It's just as if the earth were rubber and Mercator used two hands to pull it sidewise and two more to pull it up and down.

Be sure that you look at this map carefully and compare every step with the globe. At 60° N. the meridians should be curving like this

Globe

Mercator

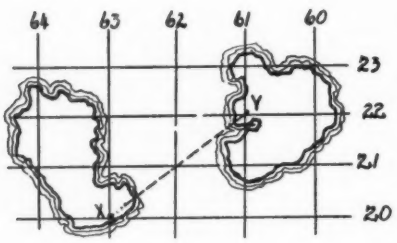


but they aren't. The parallels should be the same distance apart, but they aren't either. They're stretched farther apart.

Globe	Mercator

What did Mercator gain by making his map like this? Several things, but two important ones. First, he stretched his map sideways and lengthwise the same amount. Greenland is five times as big as it should be, *but* every bay, and harbor, and island has the right shape. It is too big, but it looks right.

Second, and most important: The lines of latitude and longitude show true direction. Navigators on ships use Mercator maps because they can take a ruler and draw a straight line between two ports. They can set their compasses and sail their ships by straight lines on the Mercator charts. A man sailing from X to Y draws a line between them. The direction is northeast. He sets his compass and stays on that course till he reaches Y.



We've talked about great circles, and their importance to ships and planes. We don't get a very good idea of great circles from the Mercator map. You'd never believe to look at this map that the shortest route between New York and London lies near Greenland and Iceland. You'd have to think hard to realize that the shortest route between San Francisco and Tokyo lies near the Aleutian Islands. You must refer to the globe constantly when you use this map—to check what you see.

Things to remember:

1. The Mercator map is a good map. It has been useful for nearly four hundred years. It will probably always be used for navigation. It is useful for other reasons, too.

a. It is easy to make.

b. It is easy to show the whole globe on one map with this projection.
c. The little countries of Northern Europe show up plainly because of the distortion.
d. It is easy to tell direction on it. North and south are at the top and bottom of the map, and east and west at the right and left.

There are facts we have to know in order to read this map intelligently. If we don't know these, we are likely to get some wrong ideas.

1. There is great distortion of areas of land and water at the north and south of this map.

2. The same scale of miles cannot be used all over this map. If a scale is given it is usually good only at the equator or within a few degrees of it.

3. Great circle distances are not easy to see on this map, and they do not appear to be the shortest distances, altho we know they are.

TROPICAL AGRICULTURAL PRODUCTION FOR CONSUMPTION IN THE UNITED STATES

EUGENE MATHER
University of Wisconsin

One of the great problems confronting us as a nation is where shall we obtain our tropical agricultural products after this war. Before World War II we relied heavily upon the tropics in the Far East. This war, however, and many others which preceded it, offer irrefutable evidence of the hazard involved in unnecessarily exposing a nation's security by placing high economic stakes far from one's own door and near another major power. Win or lose, it is bitter medicine that we are taking now from Japan, and many Americans are asking whether or not we should stake ourselves so heavily again in Asia. Certainly we should not if we can find suitable tropical areas in our own hemisphere. Already, some of our entrepreneurs, as well as our Government, are aware of this and are presenting us with some clear-cut evidence indicative of the future trend of tropical agricultural production for consumption in the United States.

There are three immense areas in the world where tropical agricultural production might locate. These are the Tropical Far East, Tropical Africa, and Tropical America. Today, tho, only the fringe of these amplitudinous areas is needed to yield the total amount of tropical agricultural products demanded by the entire world. Geographers in the United States and abroad recognize the Tropical Far East, Tropical Africa, and Tropical America as great frontier regions capable of enormously extended production of such products as rubber, cacao, pineapple, sugar cane, bananas, coffee, cinchona (quinine), copra (coconut), sisal, henequen, and chicle.

A View of Middle America

Middle America is geographically situated more favorably with respect to the United States than is any other comparable tropical area in the world.* While the Tropical Far East is about 8,000 miles from the center of our country, Middle America is only one-quarter of that distance and is located along the sea route between

* Isaiah Bowman in *The New World,* Leo Waibel, Lecturer in Geography at the Univ. of Wisconsin, and numerous others have indicated some of the important economic and strategic advantages of Middle America to the United States.

our east and west coasts. In peacetime this means reduced transportation costs. Moreover, it permits a saving in time which is important with perishable goods. During war the advantages of such a location are of cardinal strategic importance. The Tropical Far East is not only distant from our shores, but it is at the very threshold of another major power. However, if our interests were concentrated in Middle America we could shorten appreciably our defense lines. Also, we are closer to this little-developed tropical agricultural frontier than any other world power. In the event of war we would have three possible avenues of contact with Middle America: via the Pacific, via the Atlantic, and via land.

All of Middle America and southern Mexico is within the tropics, and with capital, machinery, and scientific methods, the present agricultural production could be multiplied several times. It is estimated that Guatemala, El Salvador, Honduras, Nicaragua, and Costa Rica have an aggregate of only about 900,000 acres in commercial and subsistence crops while the total land area is approximately 109,700,000 acres. Most of the commercial crop land is concentrated along rail lines, highways, and near the coastal urban agglomerations. Nicaragua, Costa Rica, Honduras, and northern and western Guatemala have large tracts of untouched land suitable for agricultural expansion.

UNITED STATES—MIDDLE AMERICAN RELATIONS

As a nation we are manifesting increased interest in this area as a potentially large producer of tropical agricultural products. As an illustration of the shift of commercial crops from the Tropical Far East to Middle America, it is interesting to note that in 1940, 325,000 seedlings of kapok were planted in Guatemala and an additional 195,000 seedlings were planted in El Salvador. We are augmenting our investments in Middle America, are actively encouraging and participating in scientific tropical agricultural research, and are promoting reciprocal and mutually beneficial trade agreements.

For years the foreign policy of the United States has been obscured by our reluctance to publicly proclaim our growing feeling that Middle America was our exclusive economic domain. Yet since the Spanish-American War we have penetrated by concessions, leases, outright ownership, and by the extension of our strategic plans until we finally attained an undisputed foothold in this realm.

Fortunately, we are rapidly clarifying our attitude towards Middle America. No longer do we cast furtive glances when we speak of our economic relationships with these countries. Rather, it is being expressed—and it is also understood—that our interests in Middle America can mutually benefit all parties involved. This forthrightness of expression, as well as the desire of the Middle American nations for capital to develop their resources, is promoting between us a growth of social, economic, and cultural intercourse. It must be borne in mind, tho, that a firm economic foundation with a secure future can not be achieved merely by one nation exploiting another. Any concentration of interests in Middle America, if it is to be long-lived, must be attained thru the mutual efforts of all peoples concerned and must result in the mutual benefit of all.

EDITORIAL NOTES AND NEWS

It is reported that the performance of the average freight train operating in the United States today, in load carried and speed of movement, is almost 120 per cent greater than it was in 1918. Among the many factors contributing to this success are improvement of roadbeds, reduction or elimination of curves and grades, heavier and long-wearing rails, double tracking, more efficient signal systems, bigger and stronger cars, and locomotives that travel faster and farther in a day and pull heavier loads. Operating methods, too, have kept pace with plant improvements. The old slow-moving freight train is being replaced by freights running on schedule. Fast Diesels at terminals have almost made the old-fashioned switch engine a thing of the past. Mechanical loading and unloading devices along with specialized types of freight cars all help promote the efficiency of the railway. Also, to be noted is the organization of the various boards and agencies which coordinate the entire transportation pattern and thereby promote a more effective functioning of freight movement. All this adds up to the fact that the average freight car today moves 50 per cent faster than it did in the World War of 1918, and moves with less terminal and loading and unloading delays.

Statisticians of the Metropolitan Life Insurance Company estimate that food is the biggest single item in the cost of rearing a child from birth to age 18, presuming the parents have an annual income of $2500 and that the family consists of three to six persons. This food cost is $2360 for a boy and $2180 for a girl, based on 1935-36 figures. Such figures help us understand the significance of food production in either peace or war times.

A 20 by 26 inch map, in color, entitled Resources for Victory—A Geo-Economic Study, is available free from the Office of Inter-American Affairs, Washington, D.C. One side of the map shows the basic and secondary products of Central and South America; the other side shows certain physical and cultural features.

DR. HUGH H. BENNETT, Chief of the Soil Conservation Service of the United States Department of Agriculture, is the chairman of the Pan American Conservation Commission. The Commission was set up in Washington in June, 1940, following a meeting of the Eighth Scientific Congress. Dr. Bennett's preliminary estimates indicate that in many of the Central and South American countries soil erosion has damaged about half of the land in cultivation.

It is just a little more than two years ago since the first international air express was inaugurated between the United States and Europe. According to the United States Department of Commerce, the first consignment for this service totaled 41½ pounds. It was carried by the Dixie Clipper which landed at Lisbon, September 29, 1941. Since then, more than four million pounds of air express have been carried by one company alone. Today, shipments on cargo planes are filled with consignments for the various war services. After the war, the major problems will probably be political rather than technical problems of operations. Natural barriers will be less significant than man-made barriers unless international restrictions are removed.

About 14,000 workers are now employed at Volta Redonda, where Brazil is building a great steel plant. The coke plant is nearing completion, and steel should be rolling by the end of 1944. A modern, low-cost workers' community, called Santa Cecilia, is housing the workers, as well as providing for their recreation and health. Volta Redonda is on the Brazilian Central Railway, between Rio and Sao Paulo. Structural steel will be made from Brazil's high grade iron ore in Minas Gerais, with coking coal from Santa Catarina.

It is reported from the Forest Service of the United States Department of Agriculture that Ecuador's output of balsa wood rose from 16,500,000 board feet in 1941 to about 24,000,000 board feet in 1942, with further expansion promised for 1943. About 25 sawmills operate along the river near Guayaquil, six in and several to the north of Esmeraldas. Kiln-drying and improvements in yard storage are improving the quality, and rigid inspection before shipping is preventing stain and decay. The wood is used in England for the famous light-weight mosquito bombers, and in this country chiefly for life rafts and floats.

Information from Peru reveals that the domestication of the vicuna is progressing satisfactorily. The vicuna, native of the high Andes, has become almost extinct since the animal was usually shot to get its coat of remarkably fine wool, one of the softest of animal fibers. In 1941, the wholesale price of the wool was $3 a pound, making the cost of an overcoat total from $350 to $400. Wartime stimulus is also pushing tea cultivation in Peru. The government has secured an English tea expert from Ceylon to supervise the development of the industry. A factory for drying and processing tea is to be built at Tingo Maria where several plantations have been planted to tea. Tingo Maria, which is on the east side of the Andes, is becoming one of Peru's important agricultural stations experimenting with crops suited to the wet tropics. Attention, too, is focused on a malaria-control project set up at Chimbote, Pacific port of the Santa River valley. Rich anthracite coal deposits are reported in this valley. This area might become a center for steel manufacture, using Peruvian iron ore brought in by water, or it might become a center of coal exports. The Pan American Highway passes thru Chimbote and connects it with Lima, distant about 250 miles. All these projects are getting encouragement from the United States.

The Texas section of the American Society of Civil Engineers recently reported plans for a new plant designed to make plastics from natural gas as a basic raw material.

There are indications that Chile is planning to develop its rich fish resources and thereby increase its food supply. There are plans to promote the chemical industries to extract vitamins from fish livers, and process the inedible parts for feed and fertilizer. Progress is indicated by the report that Chile produced about eight million tins of canned fish in 1942. This is about double the production in 1940. The cold Humbolt Current which parallels Chile's long coast line brings an abundance of plankton, native fish food.

GEOGRAPHICAL PUBLICATIONS

Hans W. Weigert. **Generals and Geographers: The Twilight of Geopolitics.** 273 pp. Oxford University Press, New York, 1942. $3.00.

In a general way, each chapter of this book is an essay on geopolitics and, in most cases, the material of the chapter is oriented around a man (or men) who played a part in the development of the subject. After an introductory chapter comparing geography with geopolitics, some representative titles are:

O. Spangler, Russia and the Future

Haushofer, the Party and the Army

Pioneers in Geopolitics (Herder, Humbolt, Ritter, Ratzel and Kjellen are mentioned as having influenced Haushofer, whom the author describes as a genius.)

Sir Halford Mackinder and the Heartland

Geopolitical Strategy in the Pacific (Haushofer again)

America, "the Satellite"

The author defines geopolitics as "Political geography applied to national power politics and its actual strategy in peace and war." Both the geographer who ponders over the space relationship of states and the political scientist who learn to use geographical factors for a better understanding of politics become involved within the realms of geopolitics. Karl Haushofer is responsible for the development of geopolitics in Germany. He took it from the realm of theory, principally from Mackinder's purely academic studies, flavored it with propaganda techniques and German nationalism, and sold it to the young leaders of his country. However, the importance of General Haushofer is over-emphasized.

Generals and Geographers is an interesting book that gives an insight into the philosophy, particularly the background, of German geopolitics. Professor Weigert's style and sometimes his method of presentation are somewhat rambling, which leads to occasional repetition of ideas. Despite this weakness, the author succeeds in that which he set out to do; namely to write a "political book." This is not so much a book about politics as a book with a political purpose. That purpose is first to warn against a peace with a German army power and secondly to warn against the ideologies of American geopolitics. The author apparently thinks both warnings are necessary.

ALDEN CUTSHALL

University of Illinois